

SURVEY AND REPORT .
OF
PRESENT AND FUTURE LOAD REQUIREMENTS
OF
RURAL ELECTRIC COOPERATIVE

Pend Oreille Electric Cooperative, Inc.
Newport, Washington
(Washington 35 Pend Oreille)

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration
Washington 25, D. C.

APPLICATIONS AND LOANS DIVISION
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TABLE OF CONTENTS

	<u>Page Number</u>
Purpose of Report	3
Summary and Conclusions	5
Method of Survey and Sources of Information ...	8
Description of the Area	12
Economy of the Area	14
Other Distributors of Power in the Area	24
Rates	26
Types of Loads to be Served	28
Farm, Non-Farm and Small Commercial	28
Recreational Facilities	31
Industrial Loads	32
Irrigation	33
House Heating	34
Estimates of Loads	36
Estimated Ultimate System Investment	37
Table III (Summary of Load Estimates)	39
Exhibits A and B	40 & 41

Drawing No. 1

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PURPOSE OF REPORT

The purpose of this report is to appraise the prospects for electric power consumption by existing and potential consumers of the Pend Oreille Electric Cooperative, Inc., and to estimate the probable power requirements of this cooperative at the end of the next two, five and ten years.

The immediate purpose of the report is to ascertain present and to estimate probable future power requirements of the cooperative and resulting load data for consideration by the Bonneville Power Administration in its studies of the feasibility of extending transmission lines into the area to supply adequate low cost power to the present and future members of the cooperative as well as to other loads independent of this study.

This report does not purport to establish the feasibility of the cooperative serving all loads tabulated in the survey nor does it intend to imply that funds are or will be earmarked by the Rural Electrification Administration for service to such loads. Each application for REA loan funds will, as in the past, be considered on its own merits.

Other purposes of the report are (1) to provide a foundation upon which to base a long range rate structure, (2) to furnish pertinent

1/ Prepared by Franklin O. Billings, Applications and Loans Division, REA, USDA.

information in connection with a future system study to be prepared by the cooperative, and (3) to serve as a guide for an effective power use program.

The attached drawing (No. 1) shows:

- (1) Tentative cooperative boundaries;
- (2) Existing and proposed transmission lines of other utilities and public power agencies;
- (3) Area proposed to be served from a tentative delivery point of Bonneville power; and
- (4) Estimated kilowatt demands and kilowatt hour consumption at the tentative point of delivery for Bonneville power for the years 1948, 1951 and 1956.

SUMMARY AND CONCLUSIONS

In 1940, less than 20 percent of the rural farm dwelling units located in northeastern Washington were equipped for the use of electric lights. Recognition of the deficiency in rural power distribution facilities led to the organization of REA cooperatives in the area including the subject Pend Oreille Electric Cooperative, Inc., with headquarters at Newport. This Cooperative's first lines were energized in July 1940. Between May 1943 and December 1945 the number of the cooperative's members increased from 422 to 489, or 16 percent; the consumption of energy per month from 35,232 to 49,894 kilowatt hours, or 42 percent; and the demand of the cooperative's system increased from 116 to 205 kilowatts, or 86 percent.

To date, REA funds have been allocated to this cooperative for the building of a total of 480 miles of line to serve a total of 906 members with central station service.

This progress through past activities, together with a survey of members' intentions of purchasing electrical farm household appliances and electrically operated farm equipment recently conducted by the cooperative in collaboration with the Bonneville Power Administration, indicates that a substantial potential market for electrical energy exists in the area served by the subject cooperative.

Table III indicates there will be a maximum demand of 602 kilowatts in 1946, 1058 kilowatts in 1951 and 2194 kilowatts in 1956. It is likewise estimated there will be a total annual energy requirement of approximately 2,520,000 kilowatt hours in 1948, 4,238,000 kilowatt hours in 1951 and 8,470,000 kilowatt hours in 1956. These estimates indicate that the load factor will be approximately 47.8% in 1948, 45.7% in 1951 and 44.1% in 1956.

It is estimated that the cooperative will be serving a total of approximately 933 members in 1948, 1132 members in 1951 and 1418 members in 1956 exclusive of irrigation pumps and house heating installations. The study indicates that a total of 620 miles of line will be required to serve all of these consumers, requiring an investment on the part of the cooperative of approximately \$770,000.

Under the present wheeling arrangements effected as an emergency measure during the war, Bonneville power is being furnished the cooperative over facilities of the Washington Water Power Company and the Mountain States Power Company at a cost to the cooperative of approximately 5.5 mills per kwh. Under this arrangement, which will remain in force for 18 months following the official declaration of the end of the war, Bonneville Power Administration supplies wholesale energy to the Pend Oreille Electric Cooperative, Inc., at 3.5 mills per kwh. In addition to the above charge, the cooperative pays a sum of 2 mills per kwh to the Mountain States Power Company as a wheeling charge for all power delivered over its facilities. Failure to maintain an adequate supply of low cost power would seriously hamper the potential economic and industrial development of the area and would deprive many rural residents of the benefits of low cost power.

It is therefore recommended that the results of this survey be made available to the Bonneville Power Administration for its consideration in the determination of the feasibility of making Bonneville power available to the cooperative over government owned facilities before the expiration of present "wheeling" arrangements with the Washington Water Power Company and Mountain States Power Company.

Farm and non-farm dwellings, productive equipment on farms, rural stores and similar commercial endeavors will constitute generally the load which will be served by the subject cooperative. In addition, summer cottages and resorts located on numerous lakes in the area are under development and will quite materially increase the annual consumption of energy the subject cooperative would be called upon to provide.

There seems no prospect for serving rural industrial loads, actual and potential. Sawmills, shingle mills and pole yards in the area are located in or near towns receiving service from other utilities. A change in this situation may not be expected and any future additions to this industry will probably also locate in or near towns presently served by other utilities. Important mineral deposits developing the greatest of all industrial loads in the county are located north of the town of Ione and outside of the cooperative's boundaries.

The expected expansion of the cooperative's system within the next ten years consists of service to approximately 400 additional farm, non-farm, and commercial consumers and to approximately 400 newly-to-be-served summer cottages, several resorts, approximately 100 sprinkler irrigation systems and about 20 rural dwellings equipped for electric house heating.

The degree of attainment of area coverage by the cooperative as well as the achievement of the estimated kwh consumption foreseen in this report will, in large measure, be dependent upon the availability of low cost power and a fully prosecuted power use program designed to attain the goals of saturation of appliances and farm equipment reflected by the estimates included in this report.

METHOD OF SURVEY AND SOURCES OF INFORMATION

In order to fairly estimate the future power requirements in the area served by the subject cooperative this survey includes consideration of the following factors:

1. The results of a land class analysis as one suitable guide to power use. During a three-day tour of the farming sections of the subject cooperative's area by the Acting Head of the Division of Agricultural Economics of Washington State College and an REA representative, joined part of the time by the County Agent and by the manager of the subject cooperative, data were obtained for determining the land class for each of approximately 200 farms. A land class map was prepared from this data under the guidance of the Director of Research of the Farm Credit Administration, Spokane, Washington, who had previously prepared similar maps of other counties. A definition and the proportionate relationship between the various land classes in the area will be found in subsequent pages of this section of this report.

2. In determining the estimated average consumption per consumer, consideration was given to the experience of systems operating in areas of similar economic and productive characteristics; the application of electric power to productive use determined by the prevailing type of farming and other related enterprises existing in the area; the effect of electric service toward stimulation of new enterprises and other economic activities in the community; the general progressiveness of the farm people and their willingness to adopt new methods and techniques with the use of electricity in farming operations; and, the influence of low wholesale power rates.

3. For the purpose of tabulating the power requirements of summer cottages, resorts, irrigation and househeating loads, these loads are analyzed separately based on known load requirements and KWH consumption of similar loads already in operation in the area or elsewhere.

4. The determination of the number of farm, non-farm, and small commercial consumers to be served in two, five and ten years is based on knowledge of the number of rural establishments in the area and the rate at which it is expected that such establishments will be electrified.

According to estimates compiled with the aid of Forest Service officials, about 410 summer cottages and approximately 5 resorts may be reached from the projected distribution lines. Estimates of these recreational consumers and loads to be served were conservatively based on the anticipated growth in the number of cottages and resorts located on many small lakes in the cooperative's area and on the records of energy consumption by seasonal cottages and resorts elsewhere in the northwestern part of the United States.

The previously referred to Land Use Class Survey was made within the subject cooperative's boundaries for the purpose of determining the degree of capability of producing farm income according to the physical features of the area under consideration. The following definitions were taken from a report of a similar survey conducted in Pierce County, Washington. 1/

1/ From Economic Land Use Class Survey of Pierce County, Washington, 1945 by the Division of Farm Management and Agricultural Economics, Agricultural Experiment Stations, State College of Washington.

"The basic factor on which full-time farms are classified is their differing abilities, because of differing combinations of physical resources, to produce income and provide for an accumulation of capital over a long period of time. Farms producing comparable levels of income, irrespective of location or type of farming, are given the same economic Land Use Class rating. The classification of an area is determined by the level of income of typical farms within that area; the boundaries of the area are decided on the basis of similar conditions of soil, topography, and climatic factors.

"The Economic Land Use Class Areas may be described briefly as follows: Economic Land Use Class 1 areas are those in which the physical features are conducive to the highest returns per farm unit. As the Land Class number declines from 1 to 5, these features are less conducive to returns per unit. Economic Land Use Class 3 areas are "average" for commercial farming in the Northern United States. Land Class 4 areas have farm returns per unit lower than those ordinarily considered acceptable, but still high enough to encourage farmers hopefully to remain. Land Class 5 areas have still lower returns per unit. Farmers who attempt to make a living in them usually are forced to give up unless they obtain substantial outside assistance."

It has been proved that five separate classes of areas based on the above criteria can be mapped consistently in the cooperative's area.

The area within the subject cooperative's boundaries contains no Land Use Class 1. Most of the cooperative's lines are located on lands of Class 2, 3, 4 and 5. The amounts of land in these classes in the area under consideration correspond respectively and roughly

proportionately as the quantities 2, 3, 4 and 5. More than one-half of the land within the cooperative's boundaries is of Land Use Class 6. Class 6 applies to areas without any potential for profitable farming, a great part of which is in National Forests.

DESCRIPTION OF THE AREA

The area containing the subject cooperative's existing and projected system of lines is comprised of Pend Oreille County south of Ione, the northeast corner of Spokane County and the southwest corner of Bonner County in Idaho. Pend Oreille County lies in the northeast corner of the State of Washington, bordering Canada on the north. Mountain ridges averaging 6 thousand feet or more flank the east and west borders of Pend Oreille County along almost its entire length. The Pend Oreille River, one of the main tributaries of the Columbia River, flows westerly out of Idaho and then turns north and runs into Canada between the two mountain ridges. At their southern ends the ridges give way gradually to lower elevations that extend into Spokane and Bonner Counties. It is in these lower elevations and in the trough between the ridges that the lines of the cooperative are located. The land averages about 2000 feet in elevation and is generally hilly and uneven. Level land is mostly limited to small patches. The only large flat area is found in the Calispell Valley, a lake bed of considerable size, a small part of which forms the present Calispell Lake. The valley has an underlayer of white clay hard for roots to penetrate. It was the only spot in the county that did not support tree growth when white settlers arrived.

Most farms are small. The average growing season of the area runs from 90 to 100 days, too short for many types of crops. The annual precipitation in rain and melted snow approximates 23 inches in the farming areas. The average fall of rain during the months of July and August is about 1.5 inches indicating a need for irrigation.

Perhaps more than half of the total land in the survey area is located within the Kaniksu National Forest, a large portion of which

was destroyed in 1910 by one of the most disastrous forest fires. The effects are still visible in the form of a scanty forest cover over much of the land. The best remaining stands of timber are located in the northern end of the county which area is to be served by the recently formed Pend Oreille Public Utility District (Washington 49 Ione D. P.). In the area served by the cooperative there is little prospect of increased timber operations while there is considerable prospect in the area to be served by the Public Utility District.

Although they are not equal to Priest and Pend Oreille Lakes in adjoining Idaho, the cooperative's area contains several lakes that have good recreational possibilities during summer months. The industrial boom that seems destined to occur in the city of Spokane will have its counterpart in summer cottage and resort developments on the lakes in the cooperative's and in adjacent areas. Along the Pend Oreille River is also a likely location for seasonal homes. Most of these lakes and the rivers have the advantage of being near Spokane.

The area is served by the main line of the Great Northern and by a branch line of the Milwaukee Railroad. Main highways traverse the region in a northeasterly direction to the Idaho Panhandle and Montana, in a southwesterly direction to Spokane and its radiating points, and northerly to points in the Pend Oreille River Valley and to Nelson, Canada. County roads, generally in good condition, are serving all of the farming areas and are kept open for winter use. Although capable of improvement the highway and road situation appears to be good and may be expected to be of considerable assistance to the economic development of the area.

ECONOMY OF THE AREA

General

Because of the physical features and the natural resources of the area within the subject cooperative's boundaries, the area's economy and anticipated economy may be divided into the activities of the area's population in undertakings of agriculture, industries of lumbering and mining, and in facilities for seasonal recreation.

While industrial loads within the subject cooperative's boundaries are not served from the cooperative's lines, they do contribute indirectly and very materially to the consumption of electric energy through the resulting demands for food supplied by farming in the area and for other services needed by those employed in local industries.

A factor bearing partly on the future use of electrical energy in the area is the existing and principal use of cordwood and slab wood for fuel. In Pend Oreille County, 94 percent of the consumers reporting the use of cooking fuel used wood for cooking in 1940. The use of coal, coke, gas, kerosene and gasoline was negligible. For heating purposes of all occupied units in 1940, 96 percent used wood while the use of coal and fuel oil was next in importance.

Agriculture

As far as agriculture is concerned an analysis of the subject cooperative's area within Pend Oreille County will apply alike to those portions within Spokane County and within Bonner County, Idaho, which are served with electric energy by the subject cooperative.

Because of soil, climate, topography and limited acreage of tillable land, full time farming in the cooperative's area generally has not

been capable of producing incomes sufficient to provide an average or higher level of living. Therefore, farming in the area has been supplemented in the past to a great extent by income from other work as found in factories, mills, mines, the service trades, etc. Farming is diversified and part time, with about half the farm operators working off farm more than one-third of the year, principally in enterprises connected with the timber industry.

The growing season within the subject cooperative's boundaries is short. Low temperatures at the change of seasons have damaged trees in bud and unripe fruit. This would account for abandoning of orchards as is evident throughout the area. Berry and vegetable production is almost entirely for home consumption only. Available data indicates that the harvest of potatoes in 1939 was but one-third of the 1929 crop.

The marginal character of much of the farmland has been limiting the size of most farms. While soil, topography and climatic factors do not favor farming generally with high income returns and the history of farming in the area to date has not been bright, the future appears more encouraging.

The land clearing program of the county is considerable and is expected to result in larger farms, rather than more farms, and in an increase in the purchasing power and standard of living of farmers.

The following figures concerning proposed land clearing and land improvement were furnished by the Pend Oreille County AAA office:

Conservation Practices Needed - 10 year Period

<u>Community</u>	<u>Clearing Land For Tillage</u>	<u>Pasture Development by Clearing And Extensive Improvements</u>
Camden	2,000 acres	4,000 acres
Newport	7,500 acres	20,000 acres
Cusick	6,500 acres	50,000 acres
Tiger	3,000 acres	10,000 acres
TOTALS	19,000 acres	84,000 acres

Nineteen thousand additional acres in tillable land in 10 years represents an increase of 75 percent. To encourage agricultural progress the Production and Marketing Administration of the U. S. Dept. of Agriculture makes cash allowances for land clearing on approved locations and for pasture development.

In addition to clearing land and as an adjunct to the precipitation of rain in the Pend Oreille Valley, about 6,000 acres are proposed to benefit by a reorganization of farm irrigation systems, including the building of approximately 25 proposed reservoirs.

Ample evidence exists in support of the belief that during the next ten years a considerable development in the production of livestock will take place in the area. Inasmuch as the terrain is unsuitable for establishing farms with large tillable acreages and inasmuch as the amount of grazing lands in the National Forest is diminishing rather than expanding, it may be concluded that the increase in livestock will take the form principally of milk cows.

A comparison of 1940 and 1945 census data for agriculture given below for Pend Oreille County will serve to point out certain existing conditions and trends in the area.

		<u>1945</u>	<u>1940</u>
Number of farms	Number	602	657
All land in farms	Acres	130,856	116,146
Average size of farm	Acres	217.4	176.8
Land from which crops were harvested, hay cut, or in orchards	Farms reporting	538	590
	Acres	25,540	21,262
	Average per farm	47.5	36.0

Livestock and Livestock Products

All cattle & calves	Farms reporting	484	474
	Number	8,596	5,607

(Continued)

<u>Livestock and Livestock Products (Cont'd)</u>		<u>1945</u>	<u>1940</u>
Cows and heifers milked	Farms reporting	466	451
	Number milked	2,612	2,090
Milk produced	Gallons	1,398,286	1,330,242
Whole milk sold	Farms reporting	81	58
	Gallons	371,305	186,032
Cream sold	Farms reporting	314	298
	Lbs. of butter fat	221,006	224,089
Chickens on hand	Farms reporting	451	429
	Number	30,019	22,574
Chicken eggs produced	Farms reporting	433	390
	Dozens	272,853	243,445
Chickens raised (including broilers & fryers)	Farms reporting	433	349
	Number	40,106	37,530
<u>Specified Crops Harvested</u>			
Oats threshed or combined	Farms reporting	90	69
	Acres	2,997	3,166
	Bushels	88,399	97,195
Oats cut for feeding, unthreshed	Farms reporting	63	3
	Acres	567	27
Barley threshed or combined	Farms reporting	27	11
	Acres	295	98
	Bushels	8,560	2,626
Spring wheat threshed or combined	Farms reporting	55	58
	Acres	854	744
	Bushels	15,078	12,383
Alfalfa cut for hay	Farms reporting	277	301
	Acres	3,964	3,656
	Tons	5,277	5,496
Timothy or clover cut for hay	Farms reporting	288	256
	Acres	8,797	5,529
	Tons	8,487	5,194
Estimated income from farm products, total for Pend Oreille County (1945 Census)		\$764,353	
Estimated average income from farm products per farm (1945 Census)		\$ 1,269	

A comparison of the values in the above tables indicates that agriculture in the area, because of soil, climatic and topography factors is developing chiefly for the benefit of livestock and stuff to feed it.

During the next ten years the expected trend is toward larger farms but without increase in numbers. Dairying mostly for the Spokane market will predominate. In 1945, the farms reporting whole milk sales numbered only 81. This represented, however, an increase of 40 percent in farms producing milk for the market and nearly 100 percent in milk sold over the year 1940. This increase seems certain to continue. As they enlarge their farms and build up their herds many of the farms reporting the sale of cream will probably change to selling whole milk in the future. Most of the cream is sold to dairies in Newport and comes from farms having a few cows only.

Not many farmers are expected to go all out for one type of agriculture. Medium-sized dairy herds of about 15 milking cows are expected to combine dairying with poultry raising. Turkey raising, now inconsequential in the area, is showing promise of developing, especially as an adjunct to dairying. The extent of chicken production in the county is indicated by about 40 commercial flocks ranging in size from 500 to 1500 while family flocks averaging 50 to 75 are common.

Prompted by the increase of milk and poultry production during the past five years the Washington Cooperative Farmers Association, during July of 1945, established a sub-station of the Spokane branch at Newport. This is an indication of the expected future poultry production in the area. The manager of the Spokane branch believes that, handled in conjunction with dairying, poultry will take the form of medium-sized

flocks (300 to 500). Similarly he visualizes as an adjunct to dairying greatly increased production of turkeys. As a channel to Spokane, west coast and national markets, the Association at the Newport station has made about 100 marketing agreements, while about 50 non-marketing agreements exists. The number of both types of agreements indicates the present extent of the Association's activities in the area. About 100 cases of eggs are shipped out each week. In the local market the Association is able to sell about three and a half times as many turkeys as have as yet been made available by the surrounding area.

Of third in importance may be considered the raising of beef cattle which at the present time is usually not of the highest quality. To improve the beefstock in the county a cattle improvement association has been formed. In the summer beef cattle are grazed on forest land. Because of the Forest Service's desire to have this land grow up in timber, grazing land in consequence will be getting less and less in the area. The number of beef cattle that eventually can be raised will depend on the amount of available private lands. Aided by irrigation, improved pasture and hay will be of assistance in supporting quality herds. The number of head, however, will probably be limited to a few thousand.

Lumbering

The west half of the Kaniksu National Forest occupies nearly one-half of the area within the subject cooperative's boundaries. Lumbering operations, such as saw mills, planing mills and pole yards are centered in the towns of Newport and Cusick. Additional mills and pole yards are planned for location in these and other towns. Because of their locations in towns receiving their energy supplies from other utilities such loads are and very likely will in the future remain outside of the cooperative's system of lines, existing and projected.

As an indication of power use for the lumbering industries in the area some of the electrified mills are listed below:

<u>Name</u>	<u>Type</u>	<u>Location</u>	Installed H.P.	Monthly KWH Consumption
North Idaho Shingle Co.	Shingle	Priest River, Ida.	193	7,000
W. A. Ross Shingle Co.	Shingle	Priest River, Ida.	131	3,150
Doolittle Brothers	Saw & Planing	Priest River, Ida.	325	12,000
Valentine & Clark	Pole Yard	Newport, Wash.	133	21,850
Diamond Match Co.	Saw & Planing	Newport, Cusick & Albeni Falls, Ida.	-	-

Of the proposed new operations may be mentioned a pole and tie plant of the National Pole and Tie Company to be located at Usk, near Cusick, Washington; and a proposed \$100,000 plant of Poles, Incorporated at Newport, Washington, which will specialize in treated tamarack poles.

For the purpose of cleaning out stands of privately owned timber very small sawmills are apt to locate along the cooperative's lines. However, these will be short lived and none are included in the load estimates.

While the war-cut of timber has been large and may continue so for some time, Forest Service officials estimate that the permanent sustained yield of all of the forest in Pend Oreille County will be small and will not exceed 10 million board feet annually.

No grounds were found for assuming that any of this cut would be milled at points available to service by the cooperative's lines. While, at the present time, there is no clear cut trend in that direction for converting it into a power potential, it may become possible that plants capable of utilizing wood waste will develop. Such loads would hardly develop along the cooperative's lines unless three-phase power is available, or is made available.

Mining

In the Metaline District in the northern part of Pend Oreille County and outside of the subject cooperative's boundary, important lead and zinc ores are being mined.

The recently formed Public Utility District No. 1 proposes to start operation in the Metaline area by serving the American Zinc, Lead & Smelting Co. The District's distribution system when constructed is expected to provide this service at Metaline as well as service to the Diamond Match Company mill at Sullivan Lake, the Town of Ione and certain rural territory released to the District by the subject cooperative. The United States Smelting Company and the Hecla Company are both reportedly planning operations in the District's area. These power requirements have been estimated to reach 10,000 KW in ten years and may develop to twice that amount. United States Bureau of Mines drillings are reported to have already established more than 20 million tons of commercial ore with much of the area not yet drilled. The Bonneville Power Administration's 115-kilovolt line being constructed from its substation at Mead near Spokane to Metaline Falls via Colville, Aladdin and Spirit will supply the energy in the P. U. D. No. 1's area of operations.

Within the cooperative's area of activities no mines are operating or existing. It is possible that loads from scattered mines, moderate in size may develop in the cooperative's area, but the likelihood is not sufficiently definite to warrant including any as load potentials. Mining loads require three-phase power and if made available at low cost where mining claims have been established it is quite possible that operations may be induced thereby. In the vicinity and clustered

around Bead Lake, quite a number of claims have been staked but indication is lacking of the likelihood of any start of operations. Mostly for serving a potentially large summer cottage load and one or two farms a line to the lake is under contract, but it is of single-phase design.

Recreation

Although not quite as outstanding as those reported from the northwestern corner of the State of Idaho, the subject cooperative's boundaries do include fine recreational opportunities. Abundant water fowl frequent the many small but beautiful lakes. Whitetail and mule deer, black and brown bear are found in the mountains. For the trout fisherman there are such popular spots as Diamond Lake. Big mackinaws have been caught in Bead Lake. Many lakes yield bass, perch and crappie. Boating and camping facilities are especially good at Diamond and Sullivan Lakes. There are eight lakes with substantial summer cottage potential. These lakes have become a favorite summer place largely for residents of the towns of Spokane and Colville. Eloika Lake, the nearest to Spokane, has strong possibilities for year-round development. The number of cottages and resorts likely of development amount to 410 and should prove to be an excellent source of revenue to the cooperative. Seasonal commercial undertakings, such as stores, service stations, boat yards, lunch rooms and others supported by cottagers and vacationists may be expected to add proportionately to the seasonal load.

The natural attractions of the area for the tourist and the sportsman are many and varied. Some progress has been made in providing the facilities which will permit full enjoyment of these attractions. However, much remains to be done before the area will obtain its share of the tourist trade. This industry has become highly competitive and the tourist trade will remain a minor industry unless the area's population

becomes tourist minded with respect to advertising media, provision of accommodations and treatment of tourists and sportsmen.

Summary

During the next ten years, because of the extensions of the subject cooperative's lines as planned and approved; an anticipated reduction of power cost to the cooperative; a planned power use program and developments through a land clearing program for tillage and pasture, the economy of the area within the cooperative's boundaries will be increasingly identified with agriculture, increased production of milk, poultry and better beef with recreation on an increased scale and with lumbering on a reduced scale, as compared with present operations.

OTHER DISTRIBUTORS OF POWER IN THE AREA

Drawing No. 1 shows the location of the existing and proposed transmission lines in the area in which the subject cooperative's boundaries are located.

Bonneville power is presently brought into the area over Washington Water Power Company lines north to Newport and thence over the lines of the Mountain States Power Company. A Mountain States line extends west beyond the subject cooperative's substation to connect again with the Washington Water Power Company's generating plant south of Calispell Lake. The Mountain States Power Company buys power from the Washington Water Power Company at Newport and some from the plant south of Calispell Lake, and distributes it to its consumers in Newport, Washington and Priest River and Sandpoint in Idaho. Mountain States also serve approximately 20 rural consumers in the subject area as well as about 200 seasonal consumers at Diamond Lake. Washington Water Power Company distributes power to its consumers in and around the towns of Dalkena, Usk and Cusick, including about 20 rural consumers.

The Town of Ione, a municipally owned utility, lying outside of the cooperative's northern boundary has recently come within the boundaries of the Pend Oreille Public Utility District No. 1 (Washington 49 Ione D. P.). The town operates a Diesel electrical generating station and the power distributed serves the town and a few consumers outside of the town.

Adjacent to the subject cooperative's lines located in Bonner County are the lines of the Northern Idaho Rural Electric Rehabilitation Association (Rural Electrification Administration cooperative Idaho 4 Bonner).

In the southwestern part of the subject cooperative's area the Citizen's Utilities Company, a power company with headquarters at Deer Park, is likewise operating lines which interlace to some extent with those of the cooperative.

In the southern and southwestern part of the cooperative's area the Inland Empire Rural Electrification Association, Inc., (Rural Electrification Administration cooperative Washington 18 Spokane) is sharing the field by operating lines which interlace, to some extent, with those of the cooperative.

In the area north of Ione to be served by the Pend Oreille Public Utility District No. 1, the Metaline Falls Light and Power Company is serving the towns of Metaline Falls, Metaline and a few rural consumers.

The Bonneville Power Administration is surveying for construction a 115-kilovolt line from the Mead substation near Spokane to Metaline Falls via Colville, Aladdin, and Spirit. The line is expected to be completed to Metaline Falls by July 1, 1947.

RATES

To permit comparison, the subject cooperative's rates and the rates of local utilities are given below in full.

Washington Water Power Company

Residential (Town)

First 12 kwh 65¢ (min.)
Next 50 kwh at 3.4¢
Next 50 kwh at 2.¢
Next 188 kwh at 1¢
Next 600 kwh at .6¢
All over 900 kwh at 1.0¢

Residential (Rural)

First 14 kwh 90¢ (min.)
Next 50 kwh at 3.6¢
Next 50 kwh at 2¢
Next 186 kwh at 1¢
Next 600 kwh at .6¢
All over 900 kwh at 1.0¢

Commercial (Town)

First 12 kwh 65¢ (Min.)
Next 188 kwh at 3.4¢
Next 300 kwh at 2.3¢
Next 3M kwh at 1.2¢
Next 15M kwh at .9¢
Next 50M kwh at .6¢
Excess kwh at .3¢

Commercial (Rural)

First 14 kwh 90¢ (Min.)
Next 186 kwh at 3.6¢
Next 300 kwh at 2.5¢
Next 3M kwh at 1.3¢
Next 15M kwh at .9¢
Next 50M kwh at .6¢
Excess kwh at .3¢

Mountain States Power Company

Residential Lighting, Cooking, Heating & Small Power

First 20 kwh at 6.5¢
Next 30 kwh at 5.5¢
Next 100 kwh at 3¢
All over 150 kwh at 2.5¢
Minimum \$1.00

Commercial Light & Small Power

First 100 kwh at 6.5¢
Next 200 kwh at 5.5¢
Next 300 kwh at 5¢
Next 400 kwh at 3¢
Excess kwh at 2.5¢
Minimum \$1.00

Commercial Refrigeration

Straight at 3¢ per kwh
Minimum \$1.00

Citizens Utilities Company

Residential

First 30 kwh at 6¢
Next 30 kwh at 4¢
Next 100 kwh at 2.5¢
Next 140 kwh at 2¢
All over 300 kwh at 1.0¢
Minimum \$1.00

Commercial

First 14 kwh \$1.00 (Min.)
Next 156 kwh at 4¢
Next 330 kwh at 2.5¢
Next 500 kwh at 2¢
Excess kwh at 1.5¢

Town of Ione (Municipal)

Residential

First 20 kwh at 8¢
Next 230 kwh at 3¢
All over 250 kwh at 2.5¢
Minimum \$1.20

Commercial

First 50 kwh at 8¢
All over 50 kwh at 2.5¢
Minimum \$1.20

Inland Empire Rural Electrification Association, Inc.

Farm and Home

First 20 kwh \$2.00 (Min.)
Next 20 kwh at 6.5¢
Next 60 kwh at 3¢
Next 100 kwh at 2¢
Next 100 kwh at 1¢
All over 300 kwh at .75¢

Commercial & Industrial Lighting
and Power Service

First 20 kwh \$2.00 (Min.)
Next 20 kwh at 6.5¢
Next 110 kwh at 3¢
Next 350 kwh at 2.5¢
Next 1M kwh at 1.5¢
Next 13.5M kwh at .8¢
Excess kwh at .6¢

Northern Idaho Rural Electric Rehabilitation Association

Farm and Home

First 40 kwh \$3.00 (Min.)
Next 15 kwh at 6¢
Next 45 kwh at 4¢
Next 150 kwh at 3¢
All over 250 kwh at 1.5¢

Commercial and Small Power

First 40 kwh \$3.00 (Min.)
Next 60 kwh at 6¢
Next 900 kwh at 3¢
Next 2M kwh at 2.5¢
Excess kwh at 1.5¢

Pend Oreille Electric Cooperative, Inc.

Farm and Home

First 37 kwh \$3.50 (Min.)
Next 43 kwh at 5.5¢
Next 120 kwh at 2.5¢
All over 200 kwh at 1.5¢

During the month of December 1945, 91 percent of all of the cooperative's farm and non-farm members consumed 200 kilowatt hours or less. Taking 200 kilowatt hours as a standard, the comparative cost of this amount of energy at the rural residential rate is illustrated in the following table:

<u>Name of Distributor</u>	<u>Cost of 200 KWH</u>
Pend Oreille Electric Cooperative, Inc.....	\$8.87
Northern Idaho Rural Elec. Rehabilitation Assn., Inc...	8.70
Mountain States Power Company.....	7.20
Inland Empire Rural Electrification Assn., Inc.....	7.10
Town of Ione.....	7.00
Citizens Utilities Company.....	6.30
Washington Water Power Company.....	4.56

TYPES OF LOADS TO BE SERVED

The loads which are served now, or which may be served in the future, by the cooperative, are discussed in the following pages. As materials become available and feasibility is established, the cooperative contemplates an extensive construction program to serve the remaining unserved farms and other loads.

Farm, Non-Farm and Small Commercial Loads. The cooperative's present loads in the area are for the most part comprised of farm improvements and very small rural communities. Consumption of electricity by farm users has been greatly retarded due to the fact that appliances and electric farm equipment have not been available during the past four years. An analysis of the operating records of the cooperative indicates that during August 1946, a total of 440 farms were served having an average consumption of 112 kilowatt hours each. During the same period a total of 121 non-farm members were served having an average consumption of 126 kilowatt hours each, the consumption of the foregoing class of consumers bringing the overall average consumption of 561 members to 115 kilowatt hours per month.

Table I illustrates the growth in the subject cooperative's number of consumers, kilowatt hours sold, amount of energy bills, miles energized, density per mile, period of operation and kilowatt demand, all under the conditions as prevailed during the war years and without benefit of an effective power use program.

Table II below is included to show how the cooperative's consumers were distributed over the various counties served during 1945.

TABLE I

PEND OREILLE ELECTRIC COOPERATIVE, INC.

ANALYSIS OF OPERATING STATISTICS

	D E C E M B E R					
	1940	1941	1942	1943	1944	1945
<u>NUMBER OF BILLED CONSUMERS</u>						
Farm	315*	301	310	339	352	391
Non-Farm	-	72	***	72	68	64
Commercial	23**	40**	***	16	15	34
Other	-	-	-	15	13	-
Total	338	413	414	442	448	489
<u>KWH SOLD</u>						
Total KWH Sold	14,336	24,631	30,330	35,232	40,970	49,894
% Increase	-	71	22	17	17	22
<u>AVERAGE KWH CONSUMPTION PER MEMBER PER MONTH</u>						
Farm	39*	54*	76	83	94	107
Non-Farm	-	-	***	56	69	63
Commercial	189**	80**	***	142	157	120
Other	-	-	***	46	53	-
Total	42	60	73	80	91	102
<u>NUMBER OF MINIMUM BILLS</u>						
Total Farm & Non-Farm	159	113	95	***	103	93
Commercial & Other	16	3	22	***	8	8
Total	175	116	117	***	111	104
% of Total	52	28	28	***	25	21
<u>MONTHLY BILLING</u>						
Total Billing	\$ 1,296	\$ 1,851	\$ 1,995	\$ 2,206	\$ 2,410	\$ 2,750
% Increase	-	42	8	11	9	14
<u>AVERAGE BILL PER MEMBER</u>						
Farm	\$ 3.67*	\$ 4.28*	\$ 4.98	\$ 5.21	\$ 5.58	\$ 5.58
Non-Farm	-	-	-	3.93	4.21	4.09
Commercial	4.63**	6.37**	-	6.89	7.03	5.91
Other	-	-	-	3.26	4.02	-
Total	3.74	4.41	4.82	5.00	5.38	5.63
Miles Energized	234	230	230	235	238	242
Density Per Mile	1.45	1.8	1.8	1.85	1.88	2.0
Months of Operation	5	17	29	41	53	65
KW Demand	***	***	***	116	***	205

* Includes Non-Farm

** Includes Other

*** Not available

Distribution of Membership by Types of Consumers and by Counties.

TABLE II

Type of Consumer	NUMBER OF MEMBERS, SUMMER 1945			
	C O U N T Y			TOTAL
	Pend Oreille	Spokane	Bonner	
Farm	246	122	14	382
Non-Farm or Residential	39	7	15	61
Commercial	13	3	3	19
Schools, Churches	8	3	2	13
Totals	306	135	34	475

The Bonneville Power Administration, acting jointly with the cooperative, recently conducted a comprehensive survey by means of a questionnaire circulated to every farm member now being served by the cooperative. The results of this survey indicate that there is a widespread interest among the cooperative's members in numerous major house-hold appliances, electrical farm equipment, as well as in sprinkler irrigation. Results of the Survey are tabulated in Exhibits "A" and "B" attached to this report. Attention is directed to the fact that the trends reflected by this survey indicate that the saturation of major appliances will be almost doubled in the case of electric ranges, while in the field of productive farm equipment certain items will increase several times the amount now in use, water heaters for dairies, for instance, being wanted 7.5 times the number in use at the present time.

Based on the information contained in the foregoing paragraphs, and in consideration of other factors and information which has been set forth in this report, it is estimated that the monthly consumption per farm member will approximate an average of 175 kilowatt hours at the end of two years, 250 kilowatt hours per month at the end of five years, and

450 kilowatt hours per month at the end of ten years. Similarly, the average demand per farm at peak load has been estimated at 0.61 kilowatts in two years, 0.87 kilowatts in five years, and 1.47 kilowatts in ten years. ^{1/} These estimates are incorporated into the load estimates contained in Table III.

Rural dwellings, occupied by shop keepers, workers of the industries and of the service trades, and others who do not raise crops and live-stock for a living, are assumed to consume less electrical energy than the average farm and in Table III of loads are considered separately under the subject "Non-Farms (Residential)".

It is estimated that non-farm consumption will attain an average monthly consumption of 150 kilowatt hours within two, 200 kilowatt hours within five and 250 kilowatt hours within ten-years' time. Corresponding estimates of average demand per non-farm consumer at peak load have been placed at 0.60 KW in two, 0.80 KW in five, and 0.90 KW in ten years.

Small commercial loads, such as stores, service stations, restaurants, etc., are consuming about as much electrical energy as is consumed on the average farm. Therefore, farm and small commercial loads have been estimated to have similar values of consumption and demands and appear in Table III as a single item.

Recreational Facilities. Most of the many small lakes in the subject cooperative's area have recreational possibilities, some to a greater extent than others. With the aid of Forest Service officials the following estimates of anticipated connections have been made:

^{1/} Engineering Memorandum No. 33R3 dated May 29, 1946 (Maximum Demand Curves) Rural Electrification Administration - Engineering Division.

		<u>Number of Connections</u>		
<u>LAKE</u>		<u>1948</u>	<u>1951</u>	<u>1956</u>
Marshall Lake	Resorts	0	1	2
	Cottages	5	10	20
Bead Lake	Cottages	12	40	60
Sacheen Lake	Cottages	20	40	100
Trout Lake	Resorts	0	1	1
	Cottages	5	10	20
Horseshoe Lake	Cottages	5	10	10
Fan Lake	Cottages	5	10	20
Eloika Lake	Resorts	1	1	2
	Cottages	5	20	50
Pend Oreille River	Cottages	<u>20</u>	<u>50</u>	<u>100</u>
Resorts total		1	3	5
Cottages total		84	225	410

This potential load can be reached by means of extensions from lines now being built or approved for construction. The estimates of power that appear in Table III are generous but are believed to be sound and are based on a period of six months occupation during each year. A large cooking and heating load should develop for the reason that even during summer months, portable heaters will come into wide use if low cost power is made available.

Industrial Loads. Except for one locker plant, the project has no industrial load at this time and none other is envisioned. Every effort was made to discover an industrial potential but none was found having a reasonable prospect of development. No seed plants or potato storage cellars are contemplated. Agriculture will be devoted principally to dairying and the raising of beef cattle and poultry. Available fluid milk will continue to be shipped to Spokane. Likewise, cream from the smaller farms will continue to go to Newport for processing. Live beeves will be shipped to

Spokane since the production of beef cattle is not expected to be large enough to warrant local meat processing plants. Slaughtering operations on a small scale now take place in Newport in connection with locker plants. Eggs are being shipped and will continue to be shipped to Spokane. Live poultry is likewise shipped for processing to Spokane. Should poultry production reach an amount sufficient to warrant local processing, this would likely take place at Newport. In the development of mining loads no encouragement was encountered. Wood products industries, if they develop, are likely to develop close to the sawmills and pole yards. What there is of existing or potential industrial loads is located in towns now served by other utilities. The sawmills in the area have only small supplies of timber remaining to draw on. No one in the Forest Service was found who felt that sawmill or shingle mill operations of any permanency would become established along the cooperative's lines. Inasmuch as no actual industrial potential was found, none is included in the load estimates.

Irrigation: The project area is expected to be devoted increasingly to dairying in the future. To supplement the precipitation of rain in the Pend Oreille Valley, power can be put to good use for sprinkler irrigation. Most of the farms at the present time are small but as the trend to increase the size of farms continues, it will result in greater opportunity for the use of power in farming operations. Sprinkler irrigation will help to create greater production on limited acreages, but development in that direction is not expected to be rapid. Since the water from mountains through numerous creeks is available with little effort to most farms, single phase motors will generally suffice to handle the load of individual sprinkler installations.

At the present time some irrigation by diversion is practiced between Newport and Ione in Pend Oreille County. Eighty-two farms irrigating 1,654 acres were reported by the 1940 Census. In addition much interest in sprinkler irrigation has been developed recently and it is anticipated that this type of irrigation will prove to be most adaptable for the type of terrain encountered in the area.

It is noted that 42 out of 73 farmers replying to the questionnaire considered the subject of irrigation. Thirty-four of these indicated that they expect to irrigate using sprinkler installations. Based on this and other information pertaining to the area, it is estimated that the system will serve a minimum of 5 sprinkler irrigation installations at the end of two years, 25 at the end of five years, and 100 at the end of ten years. It is further estimated that 7.5 horsepower motors will be used having an average annual consumption of 6,000 KWH per season. A diversity factor of 1.42 has been applied in arriving at the contributed demands to the overall system demand.

House Heating. The heating of homes by electricity is becoming of increasing interest to home owners throughout the Northwest.

The number of electrically heated homes which the cooperative will be serving at the end of 1956 is not accurately predictable at this time. For estimating purposes it appears reasonable and satisfactory to assume that three percent of all rural homes are rebuilt or replaced by modern structures annually and further, that at least 10 percent of the normal 3 percent dwelling replacement, or 0.3 percent of the farms served by the cooperative during the respective periods of the estimates will be equipped for electric heating.

As building materials become more readily obtainable a more accelerated replacement will be experienced until the present backlog in home construction has been overcome. Therefore, for estimating the number of house heating installations to 1950, inclusive, the normal rate of installations is doubled from .03 to .06 percent. Accordingly, the number of estimated house heating installations would develop as follows:

<u>Year</u>	<u>Percent Replacement</u>	<u>Total Number Heating Installations</u>
1947	.06	3
1948	.06	5
1949	.06	8
1950	.06	11
1951	.03	12
1952	.03	14
1953	.03	15
1954	.03	16
1955	.03	18
1956	.03	19

Tests conducted by the Bonneville Power Administration and others have indicated an average maximum demand of 11 kilowatts and an average annual consumption of 17,500 kilowatt hours for 5 and 6 room homes in certain areas. To this demand an overall system diversity factor of 1.5 has been applied in arriving at the amount by which system peak will be increased through serving electrical house heating installations.

ESTIMATES OF LOADS

Table III reflects the detailed estimates of maximum kilowatt demands and kilowatt hour consumptions anticipated in 1948, 1951 and 1956.

These estimates are broken down into the number of each type of consumer and shows the maximum demand of, and the factor applied to each, in order to arrive at the proportion of kilowatt demand that each type of load contributes to the system total. For example, @11/1.5F refers to a total estimated demand of 11 kilowatts and an overall factor of 1.5. This factor represents the demand factor of the individual load, plus diversity between loads of the same type and overall diversity between loads of different types when connected to the system. In this manner the loads of resorts, irrigation and house heating are reduced to a value which may be added arithmetically to the estimated average demands of farm, non-farm, and commercial consumers which have been arrived at through experience and through the use of curves referred to in this report.

System losses have been applied in each case in order to arrive at the total kilowatt hour requirements of the system and are based on the operating experience of the cooperative as reflected by the operating records. A conservative estimate would place these losses at 22% in 1948, 20% in 1951 and 18% in 1956.

ESTIMATED ULTIMATE SYSTEM INVESTMENT

To arrive at a fair basis upon which a long range rate structure may be considered, it is necessary to arrive at an approximation of the ultimate investment in distribution lines which the cooperative must make.

For this purpose the present system, plus all foreseeable extensions that may be made within the next decade are taken into consideration. A reasonable estimate of total miles of line may be arrived at on a density basis to which should be added the independent mileage which will be necessary to serve irrigation pumps and any miscellaneous loads.

Table III indicates that a total of 870 farm and small commercial, 130 non-farm, and 410 seasonal consumers will be served by the cooperative by 1956. On the basis of an ultimate consumer density of 2.0 per mile for farm, non-farm and commercial consumers and 5 per mile for seasonal cottages and resorts, the following tabulation reflecting total ultimate miles of line is made:

Farms, Non-Farm and Commercial Consumers	$\frac{1000}{2} = 500$ miles
Cottage and Resorts	$\frac{415}{5} = 83$ miles
Irrigation pumps (average .2 miles each) =	<u>20 miles</u>
Total	603 miles
Miscellaneous (approximately 3%)	<u>17 miles</u>
Grand Total	620 miles

A part of this mileage will be comprised of a 3-phase line in order to assure proper voltage regulation and balance of load on the system. Mileages, as reflected on the system's key map were scaled and the

following estimates of 3-phase, 2-phase and single-phase lines were made:

Estimated 3-phase line	-	115 miles
Estimated 2-phase line	-	35 miles
Estimated 1-phase line	-	430 miles
Estimated services	-	40 miles
Total		<u>620 miles</u>

The following calculations of ultimate investment of the cooperative is based on line construction costs somewhat below prevailing contract prices in order to arrive at an average cost of construction between present day and prewar levels:

3-phase line	115 miles @ \$1400	-	\$	161,000
2-phase line	35 miles @ \$1100	-		38,500
1-phase line	430 miles @ \$ 900	-		387,000
Services	40 miles @ \$1000	-		40,000
Total - Distribution Lines			\$	<u>626,500</u>

Meters, etc., 1539 @ \$15	-	\$	23,000
Office furniture and fixture	-		3,000
Transportation equipment	-		3,500
Office building	-		10,000
Laboratory equipment	-		1,000
Communication equipment	-		3,000
Miscellaneous tools and equipment	-		2,000
Total		\$	<u>45,500</u>

General Overhead:			
Organization expense - 1539 @ \$5	-	\$	7,700
Miscellaneous construction expense - 2%	-		13,000
Engineering & Supervision - 5%	-		34,000
Legal expense - approximately 1%	-		6,800
Total - General Overhead		\$	<u>61,500</u>

Sub-Total	\$	733,500
Contingencies (approximately 5%)		<u>36,500</u>

Grand Total Investment	\$	770,000
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It has been attempted in the foregoing estimates to arrive at the total investment by the cooperative necessary to serve only those loads enumerated in Table III without benefit of the detailed study which is necessarily a part of the "Ultimate System Study" to be prepared by the cooperatives' Engineers.

TABLE III

SUMMARY OF LOAD ESTIMATES

WASHINGTON 35 PEND OREILLE

TYPE OF CONSUMER	NUMBER OF CONSUMERS			MAXIMUM KW DEMAND			ANNUAL KWH CONSUMPTION			
	1948	1951	1956	1948	1951	1956	1948	1951	1956	
FARMS & SMALL COMMERCIAL	735	783	870	@.61 450	@.87 680	@1.47 1,275	@2100 1,543,500	@3000 2,349,000	@5400 4,698,000	
NON-FARM (RESIDENTIAL)	110	117	130	@.60 66	@.80 93	@.90 117	@1800 198,000	@2400 280,800	@3000 390,000	
SUMMER COTTAGES	84	225	410	@.40 34	@.60 135	@.75 307	@1000 84,000	@1500 337,500	@2000 820,000	
RESORTS (@ 15 KW EA.)	1	3	5	15	45	75	@21,000 21,000	@21,000 63,000	@21,000 105,000	
*SPRINKLER IRRIGATION PUMPS (7.5 HP)	5	25	100	@6.0/1.42F 21(X)	@6.0/1.42F 105	@6.0/1.42F 420	@6000 30,000	@6000 150,000	@6000 600,000	
HOUSE HEATING	5	12	19	@11/1.5F 37	@11/1.5F 88(X)	@11/1.5F 140(X)	@17,500 87,500	@17,500 210,000	@17,500 332,500	
SUB-TOTAL	940	1165	1534	602	1058	2194	1,964,000	3,390,300	6,945,500	
PLUS EST. SYSTEM LOSSES							@22% 556,000	@20% 847,700	@18% 1,524,500	
SYSTEM TOTALS	940	1165	1534	602	1058	2194	2,520,000	4,238,000	8,470,000	

* IN THE CASE OF SPRINKLER IRRIGATION AND HOUSE HEATING DEMANDS, WHICH OCCUR AT DIFFERENT SEASONS OF THE YEAR, ONLY THE GREATER OF THE TWO DEMANDS ARE INCLUDED IN THE TOTALS. ACCORDINGLY, ITEMS MARKED (X) ARE NOT INCLUDED IN COMPUTING TOTAL DEMANDS.

PEND OREILLE ELECTRIC COOPERATIVE
Newport, Washington
Appliances and Farm Equipment
Saturation Data

Based on 597 questionnaires, 93 replies, or 15.6%. September 1946

Household Appliances	Now In Use		Anticipated Purchases	
	Units	%	Units	%
Clock	282	47.	154	26.
Coffee Pot	122	20.	103	17.
Dishwasher	--	--	26	04.
Fan	148	25.	51	09.
Food Mixer	96	16.	160	27.
Grill	45	08.	26	04.
Heater (Portable)	90	15.	83	14.
Heat Blanket	6	01.	64	11.
Heating Pad	135	23.	51	09.
Hot Plate	443	74.	96	16.
Iron	565	95.	39	07.
Ironer (Mangle)	13	02.	45	08.
Pump (Electric)	289	48.	122	20.
Radio	616	103.	38	06.
Range	58	10.	116	19.
Refrigerator	302	51.	250	42.
Roaster	77	13.	128	21.
Sewing Machine	77	13.	109	18.
Sun Lamp	32	05.	19	03.
Toaster	295	49.	160	27.
Vacuum Cleaner	115	19.	148	25.
Waffle Iron	270	45.	141	24.
Washing Machine	469	79.	96	16.
Water Heater	58	10.	160	27.
<u>Refrigeration</u>				
Walk-In	-	-	20	03.
Reach-In	-	-	13	02.
Home Freezer	-	-	19	03.

NOTE: Unit Price and Dollar value of each item has been omitted.

EXHIBIT A

PEND OREILLE ELECTRIC COOPERATIVE
Newport, Washington
Appliances and Farm Equipment
Saturation Data

Based on 476 Farm Consumer questionnaires and 73 replies, or 15.3%
September 1946

Electric Farm Equipment	N o w I n U s e		Anticipated Purchases	
	Units	%	Units	%
<u>General:</u>				
Feed Cutter	13	03.	13	03.
Feed Elevator	-	-	19	04.
Feed Grinder	32	07.	77	16.
Feed Mixer	-	-	19	04.
Fence (Electric)	212	45.	103	22.
Hay Chopper	13	03.	58	12.
Hay Dryer	-	-	39	08.
Hay Hoist	13	03.	26	05.
Pump (Barn)	58	12.	26	05.
<u>Dairy:</u>				
Cream Separator	160	34.	109	23.
Silage Cutter	6	01.	13	03.
Milking Machine	186	39.	90	19.
Water Heater	6	01.	45	09.
Water Warmer	6	01.	45	09.
<u>Shop:</u>				
Battery Charger	77	16.	45	09.
Bench Grinder	160	34.	116	24.
Band Saw	6	01.	19	04.
Bench Saw	58	12.	77	16.
Drill Press	45	09.	103	22.
Lathe (Metal)	-	-	6	01.
Lathe (Wood)	19	04.	19	04.
Planer	13	03.	26	05.
Welder	26	05.	109	23.
<u>Miscellaneous:</u>				
Dryer (Fruit)	6	01.	6	01.
Spray (Fruit)	6	01.	6	01.
Washer (Fruit)	26	05.	-	-
Brooder (Chick)	141	30.	39	08.
Incubator (Chick)	19	04.	13	03.
Water Warmer	51	11.	39	08.

NOTE: Unit Price and Dollar value of each item has been omitted.

EXHIBIT B

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